

1071  
010001

Surname	Centre Number	Candidate Number
Other Names		2

**GCE AS/A level**

1071/01

**BIOLOGY/HUMAN BIOLOGY – BY1**

A.M. WEDNESDAY, 11 January 2012

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	8	
3.	8	
4.	11	
5.	4	
6.	10	
7.	13	
8.	10	
Total	70	

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

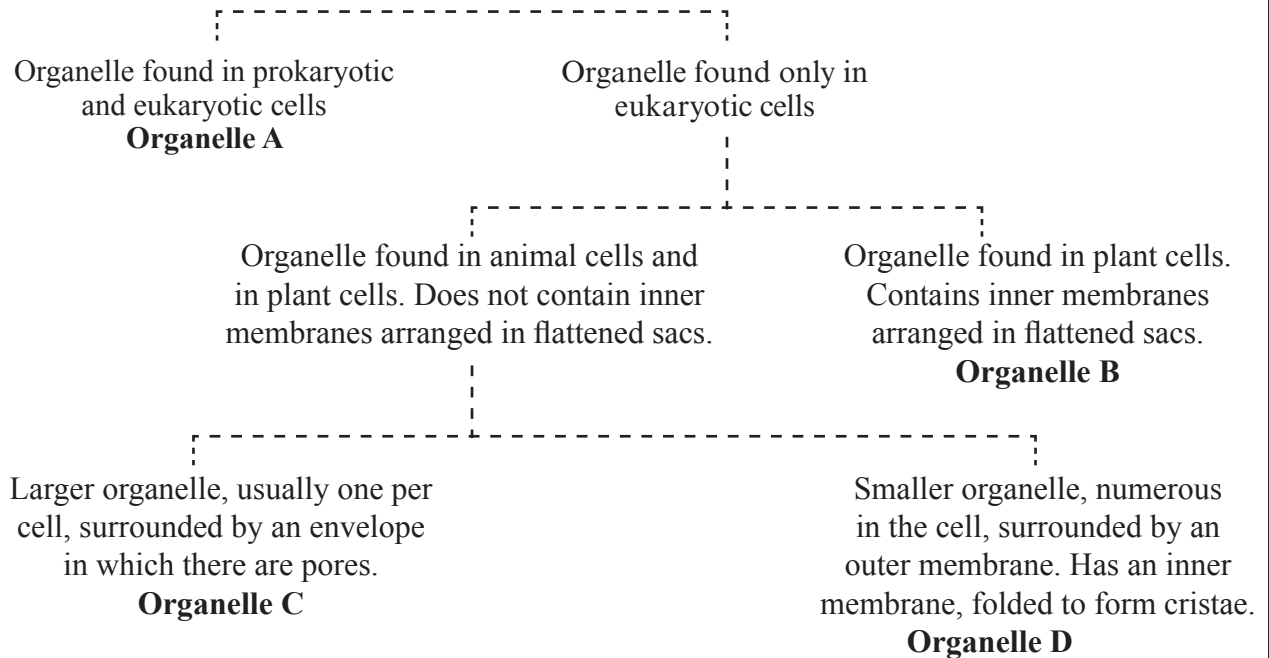
You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.



J A N 1 2 1 0 7 1 0 1 0 1

1. The diagram shows how some organelles may be distinguished from each other.



- (a) (i) Name organelle **D**. [1]

.....

- (ii) Describe the function of organelle **D**. [2]

.....

.....

.....

- (iii) Name a cell that contains **large** numbers of organelle **D**. [1]

.....



(b) Which of the organelles **A**, **B**, **C** or **D** is a ribosome?

[1]

.....

(c) What is the function of the pores in organelle **C**?

[1]

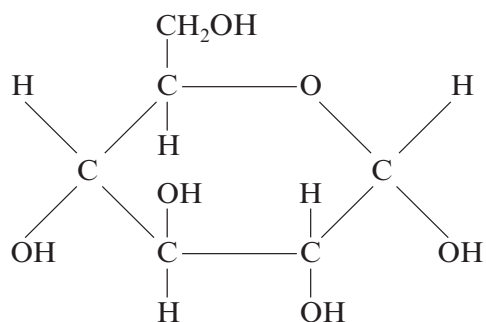
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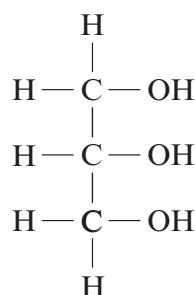
**(Total 6 marks)**



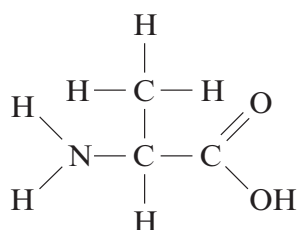
2. The following diagrams represent the structure of four biologically important compounds.



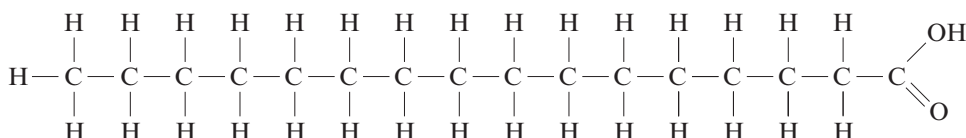
A



B



C



D

- (a) A chemical element found in a molecule of compound **C** is not found in molecules of the other three compounds. **Name** this element. [1]

.....

- (b) A reducing sugar in solution can be detected in the laboratory.

- (i) Describe the biochemical test you would use to show that the solution contained a reducing sugar. [2]

.....  
 .....  
 .....

- (ii) Which of the compounds **A** to **D** will give a positive result with this biochemical test? [1]

.....

- (c) Which of the compounds **A** to **D** has molecules that will join together by peptide bonds? [1]

.....



- (d) (i) Which of the compounds **A** to **D** is a fatty acid? [1]

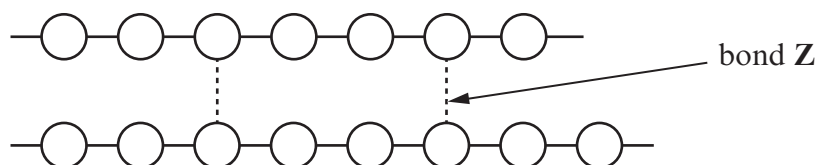
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- (ii) State how the structure of a saturated fatty acid differs from the structure of an unsaturated fatty acid. [2]

.....  
 .....  
 .....  
 .....

**(Total 8 marks)**

3. The diagram represents part of a cellulose molecule.



- (a) (i) Name bond **Z** as shown on the diagram. [1]

.....

- (ii) Explain the importance of bond **Z** in the role of cellulose in plant cell walls. [2]

.....  
 .....  
 .....

- (b) (i) Name the chemical reaction by which monomers join together to form cellulose. [1]

.....

- (ii) Chitin has many chemical and structural similarities to cellulose. In chitin what additional compound replaces one of the  $\text{-OH}$  groups in each of its monosaccharides? [1]

.....

- (iii) State the structural role of chitin in insects and describe its properties that make it suitable for this role. [1]

.....  
 .....



(c) Other polysaccharides have a storage function.  
Name a storage polysaccharide found in:

(i) animal cells;

[1]

.....

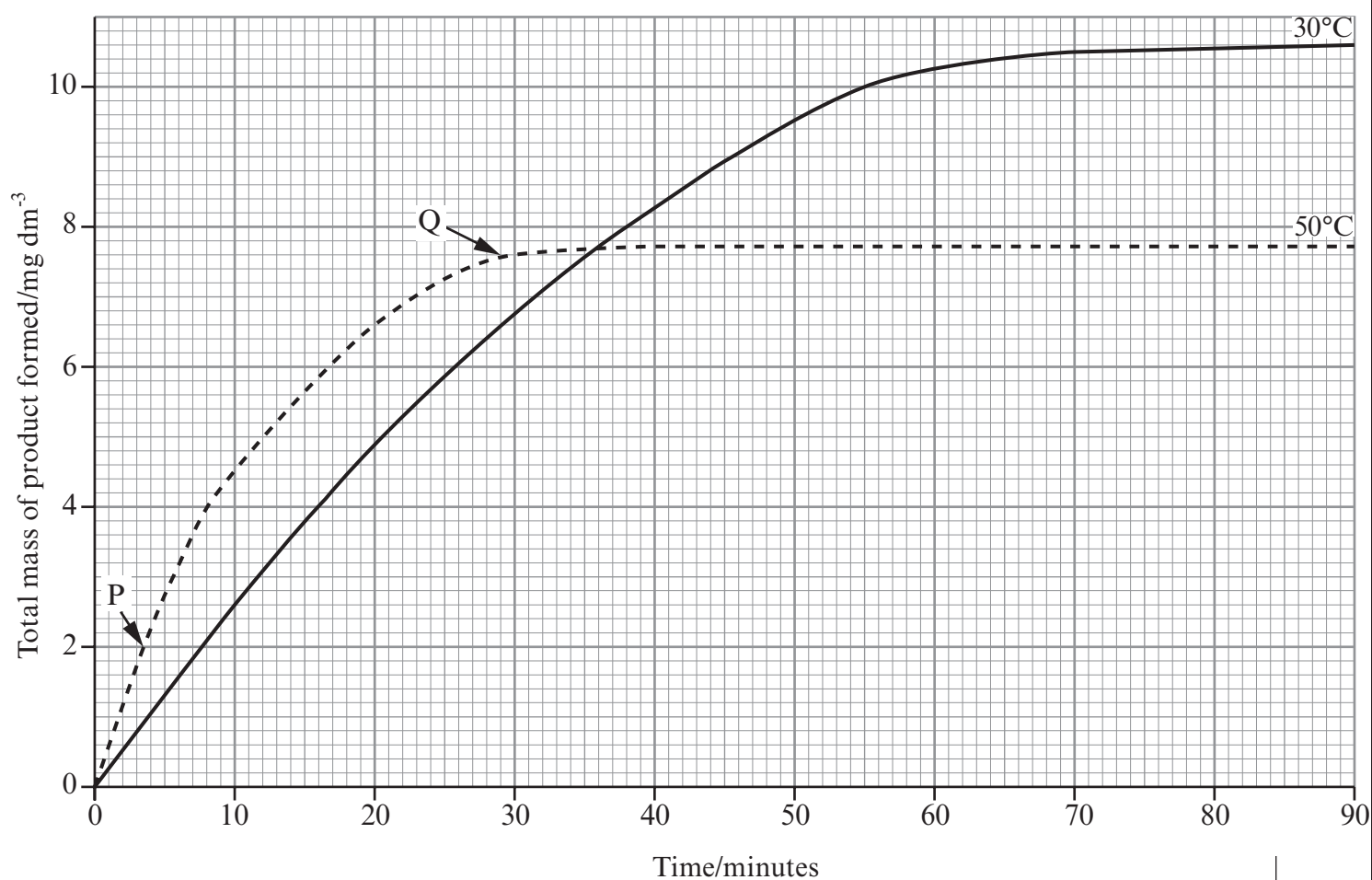
(ii) plant cells.

[1]

.....

(Total 8 marks)

4. An investigation was carried out to determine the mass of product formed in an enzyme-controlled reaction at two different temperatures, with an excess concentration of substrate. The results are shown in the graph.



- (a) (i) Calculate the rate of reaction in the first 10 minutes at 30°C. [1]

Rate = .....  $\text{mg dm}^{-3} \text{ min}^{-1}$

- (ii) State the factor which determines the rate of reaction between points **P** and **Q** on the graph. [1]

- (b) (i) Explain why the initial rate of reaction was slower at 30°C than at 50°C. [2]

- (ii) Explain the shape of the curve between 30 minutes and 60 minutes at 50°C. [3]

- (c) The investigation was repeated at 30°C with the addition of a competitive inhibitor.

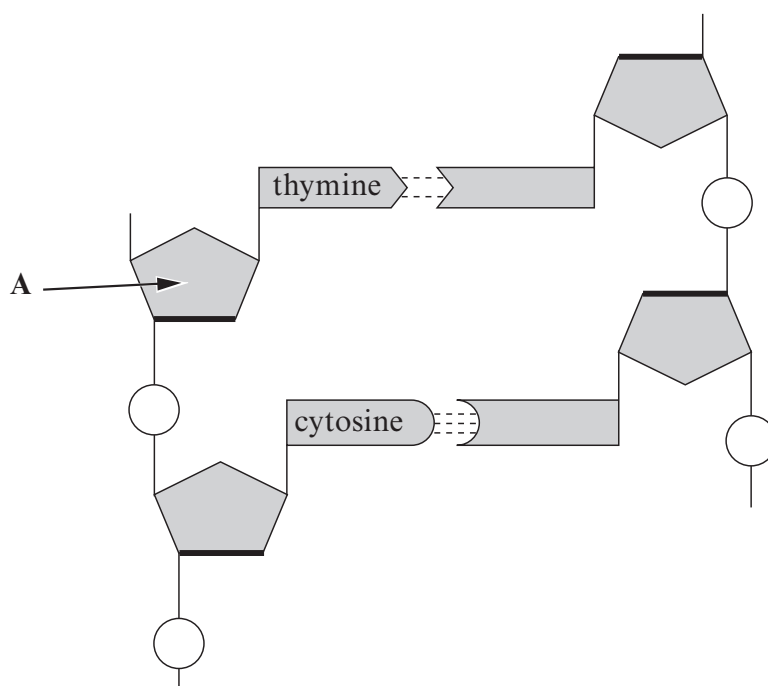
- (i) Draw the expected curve on the graph. [1]

- (ii) Explain how a competitive inhibitor would bring about this effect. [3]

(Total 11 marks)



5. The diagram represents the molecular structure of part of a DNA molecule.



- (a) Name part A.

[1]

.....

- (b) Part of a DNA molecule has the following sequence of bases.

T-A-T-C-G

- (i) In the table below write the letters for the sequence of bases of the complementary portion of DNA. [1]

DNA molecule	T	A	T	C	G
complementary DNA					

- (ii) Biochemical analysis of a sample of DNA showed that 30% of the bases were guanine. Calculate the percentage of the bases in the sample which would be adenine. Show your working. [2]

Answer .....

**(Total 4 marks)**





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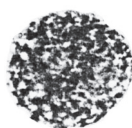
6. The photographs show chromosomes during the stages of mitosis.



H



I



J



K



L

(a) (i) Place the stages into the correct sequence. The first box has been completed. [1]

J

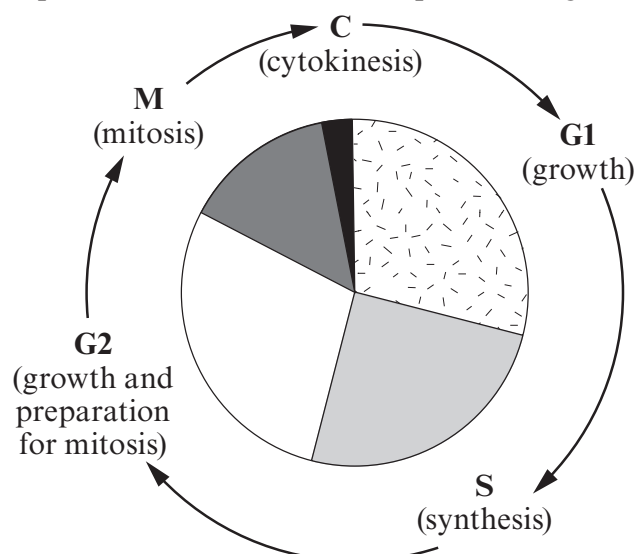
(ii) Name stages:

[2]

I .....

L .....

(b) The diagram represents the events that take place during the cell cycle.



The table below shows the DNA content of a cell measured during one cell cycle.

<i>Stage</i>	<i>DNA content of cell/arbitrary units</i>
G1	20
S	20 increasing to 40
G2	40
M	40
C	40 decreasing to 20

- (i) State the name of the period in the cell cycle that includes stages G1, S and G2.[1]

.....

.....

- (ii) State **two** events that occur during this period. [2]

.....

.....

- (c) Using information provided in the diagram and the table, explain why it is important that the DNA content of the cell increases during stage S and decreases during stage C. [2]

.....

.....

.....

- (d) Explain how mitosis maintains genetic stability. [2]

.....

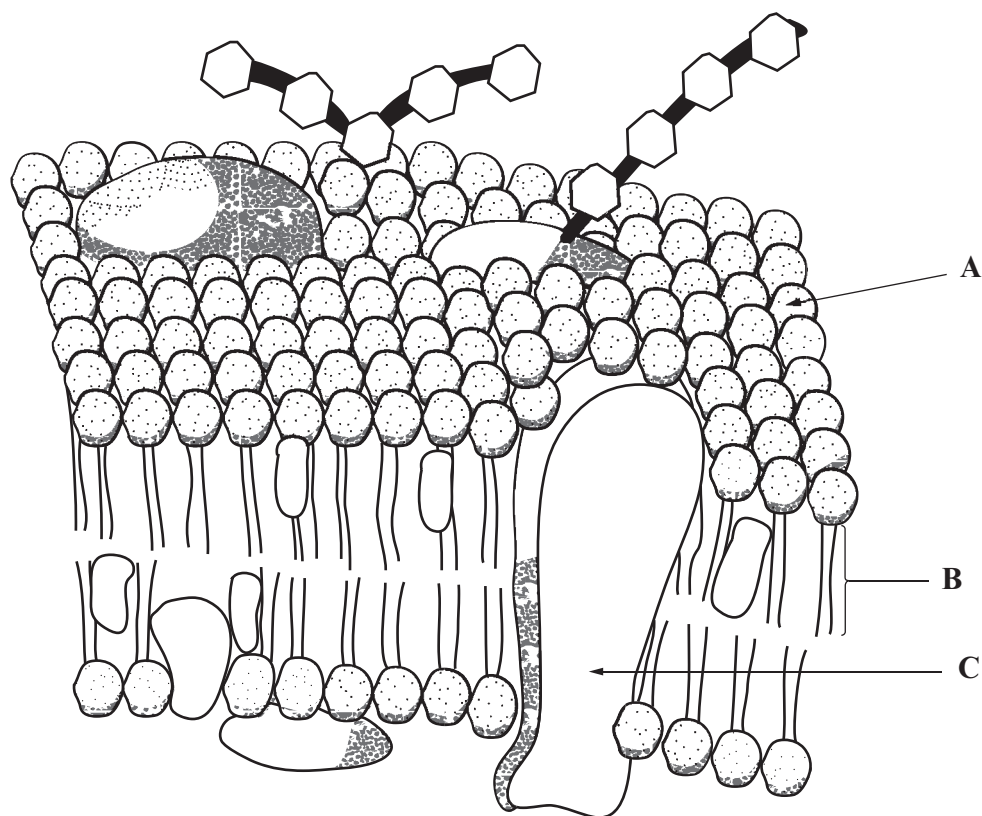
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**(Total 10 marks)**



7. The diagram shows the plasma membrane of an animal cell.



- (a) State the names of the structures labelled **A**, **B** and **C**.

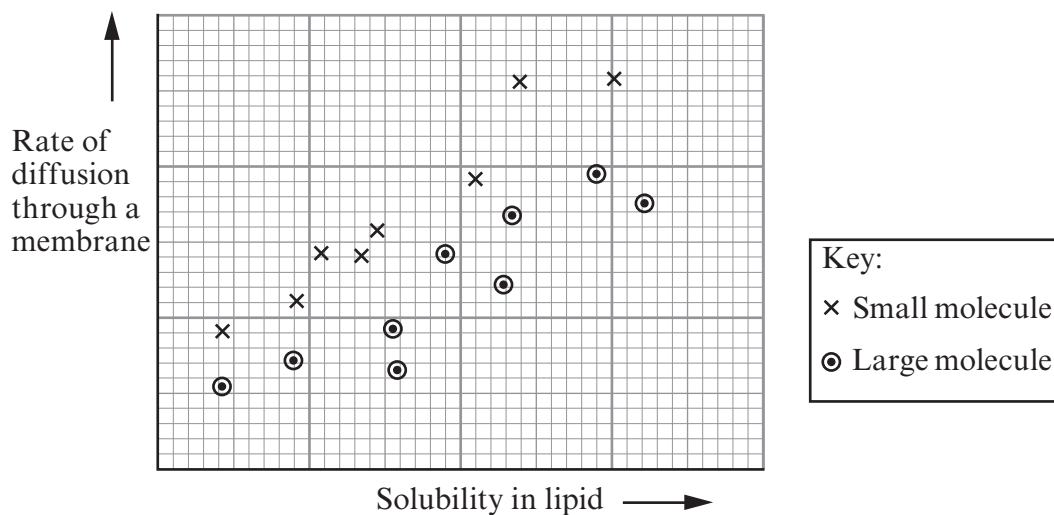
[3]

**A** .....

**B** .....

**C** .....

- (b) The graph shows the effect of molecule size and solubility in lipid on the rate of diffusion of substances through a cell surface membrane.



- (i) State with an explanation how the solubility in lipid affects the rate of diffusion through a membrane. [2]

.....

.....

.....

.....

- (ii) Describe how molecular size affects the rate of diffusion. Suggest an explanation for your answer. [2]

.....

.....

.....

.....

- (c) Name **two** factors which affect the rate of facilitated diffusion of a substance through a membrane. [2]

1. ....

2. ....

- (d) Vitamins B<sub>1</sub> and K enter cells by crossing the plasma membrane. As vitamin B<sub>1</sub> is water soluble while vitamin K is fat soluble they take different routes across the membrane. Explain how the different routes taken by these vitamins into a cell, is determined by the structure of the plasma membrane. [4]

vitamin B<sub>1</sub> .....

.....

.....

vitamin K .....

.....

.....

**(Total 13 marks)**



Any diagrams included in your answer must be fully annotated.

[10]

[10]





